MORE than a hundred years ago that charming naturalist White of Selborne jotted down in a letter to his friend Daines Barrington some very curious and interesting facts concerning earth-worms, their uses and habits. "Earth-worms," he wrote, "though in appearance a small and despicable link in the chain of nature, yet, if lost, would make a lamentable chasm. For to say nothing of half the birds and some quadrupeds which are almost entirely supported by them, worms seem to be the great promoters of vegetation, which would proceed but lamely without them, by boring and perforating and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves into it, and most of all by throwing up such infinite numbers of lumps of earth, called worm-casts, which being their excrement, is a fine manure for grain and grass. Worms probably provide new soils for hills and slopes where the rain washes the earth away. The earth, without worms, would soon become cold, hard-bound, and void of fermentation, and consequently sterile." More than half a century later White's observations attracted the attention of Charles Darwin, then a young man just entering upon his long and honorable career of philosophic investigation; and in 1837, in one of his earliest contributions to science, a paper read by him before the Geological Society of London on "The Formation of Mould," he referred to White's brief but minute remarks on earth-worms, and using them as the groundwork of his discourse, proceeded more fully to elaborate, as the fruit of his own investigations and reflections, the natural history and the extensive usefulness to man of this most lowly and insignificant of living creatures. Since then more than forty years have sped, but in the mean time Mr. Darwin, amid the inthralling urgency of his literary labors, and in the plenitude of his reputation, has never lost sight of his early inquiry, and now gives us the results of his prolonged observations in a monograph on *The Formation of Vegetable Mould through the Action of Worms*,[1] which is one of the most curious as well as

[1] *The Formation of Vegetable Mould through the Action of Worms.* With Observations on their Habits. By CHARLES DARWIN, LL.D. 12mo. pp. 326. New York: D. Appleton and Co.

pleasing contributions to natural history that has appeared since White of Selborne ceased to regale the world with his diurnal jottings. The memoir is very largely the record of a personal investigation, pursued with unflagging enthusiasm and invincible patience, of the nature, structure, habitations, and habits of earth-worms, their faculty of perception through the senses, their mental powers and manifestations of intelligence, and their place in nature as relates to the outer world and other creatures. But its more immediate subject is the amount of earth which is brought up by worms from beneath the surface in the form of "castings," and is afterward spread out more or less completely by the rain and wind, and the part which worms have thereby played in the burial of ancient buildings and remains, and in the pulverization and denudation of the land. Among the interesting conclusions reached by Mr. Darwin, bearing upon the important part that worms have played in the history of the face of the earth, are the following: that the whole superficial bed of vegetable mould passes through the bodies of worms in the course of every four years; that by these means fresh surfaces, equal to two-hundredths of an inch annually, are continually exposed to conditions favorable to their decomposition and disintegration, and are so scattered by the wind and rain as to exert a prodigious influence upon the face of nature, affecting even the conformation of mountains and the course of great rivers; that the castings of worms have buried and preserved from the action of the elements many elegant and curious tessellated pavements and other extensive remains; that worms prepare the ground in an excellent manner for the growth of fibrous-rooted plants and seedlings of all kinds; that they expose the mould to the air, sifted from stones, and mingle all its particles together as intimately as they are mingled by the gardener who prepares fine soil for his choicest plants; that by them the bones of dead animals, insects, etc., the shells of land mollusks, and leaves, twigs, stalks, etc., are buried beneath their castings, and brought within reach of the roots of plants; that they enrich and render the land porous by the leaves and other substances which they drag into their burrows for food, thereby greatly facilitating the downward passage of roots; and that, in fact, the earth-worm is the earliest and most universal ploughman, by whom, long before the plough was invented, the land was regularly ploughed, and still continues to be ploughed—so that it may be doubted whether there are many other animals which have played as important a part in the world as these lowly organized creatures.